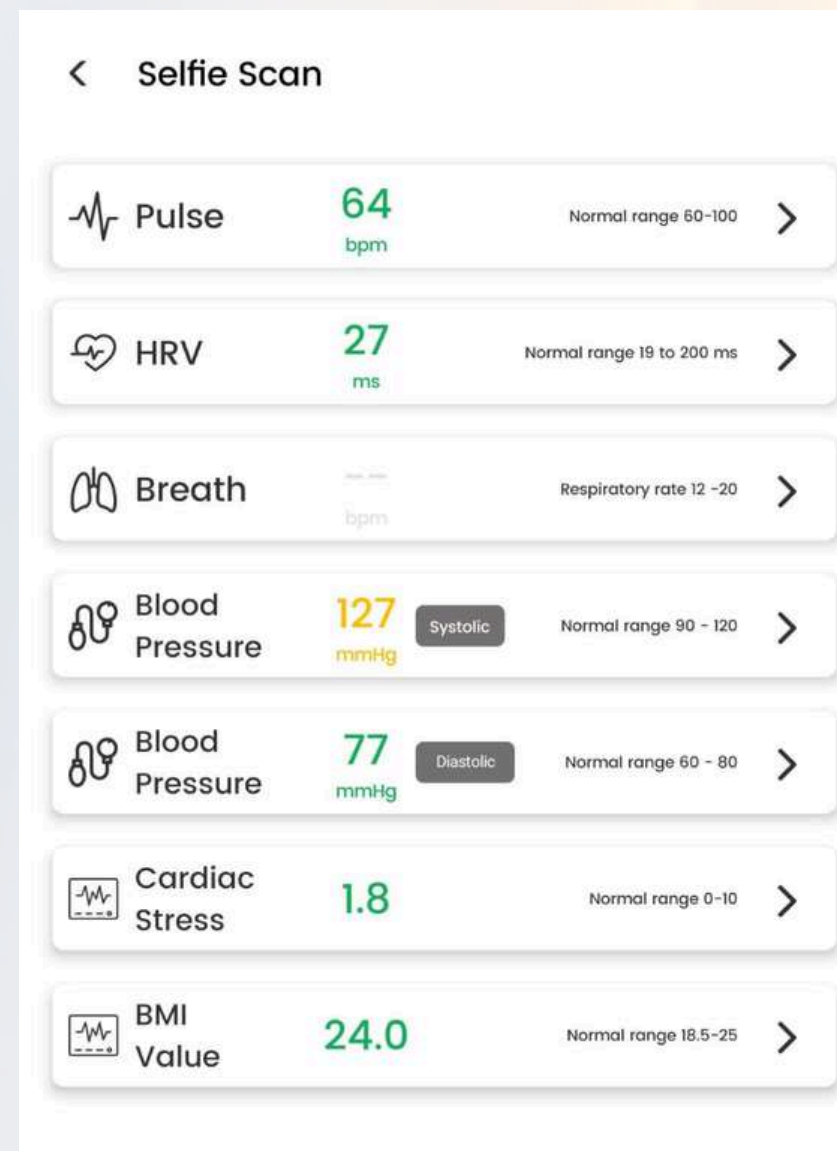
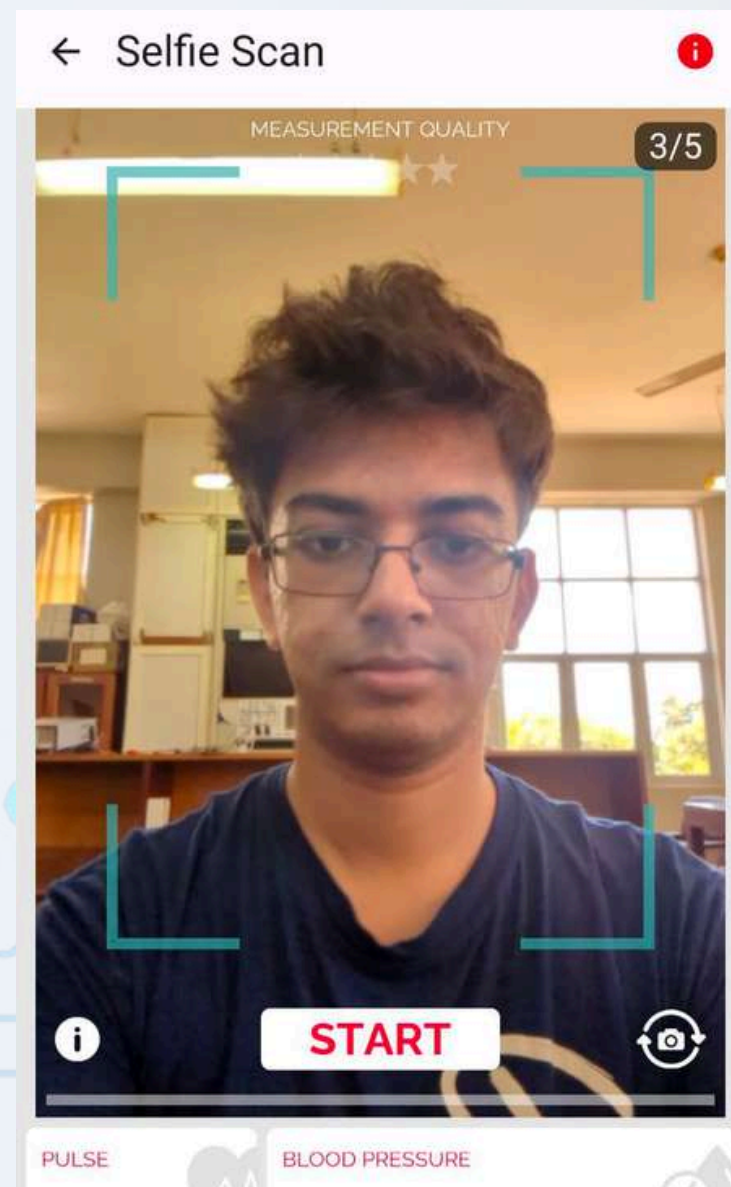


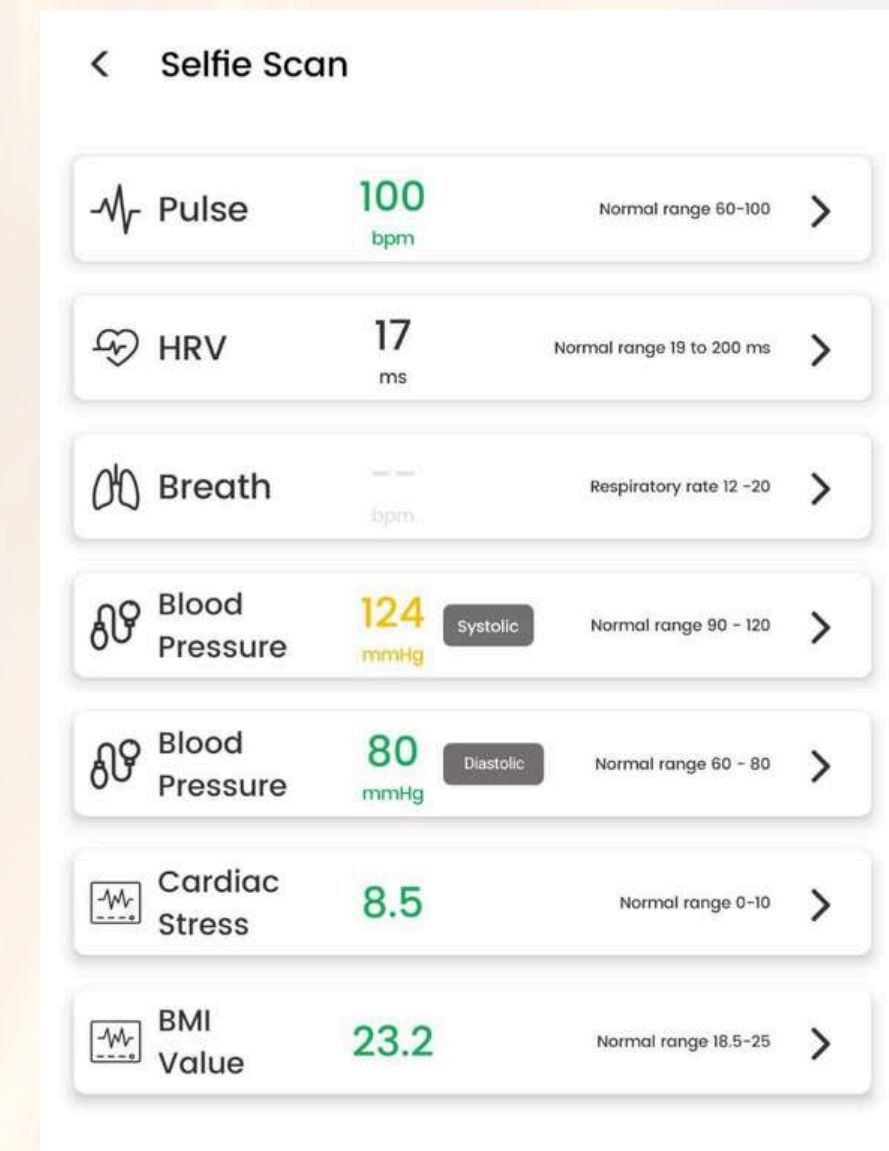
Physiological Signal Extraction from Video

Existing Solutions:

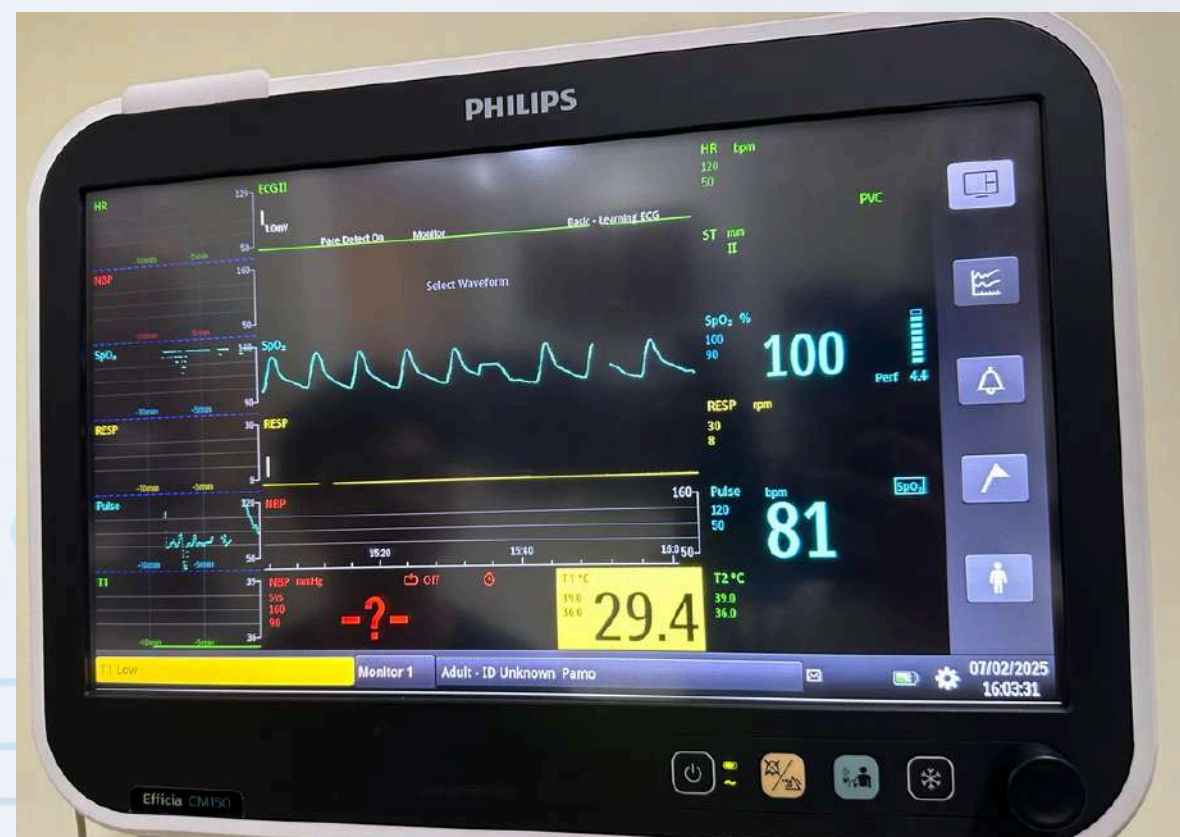
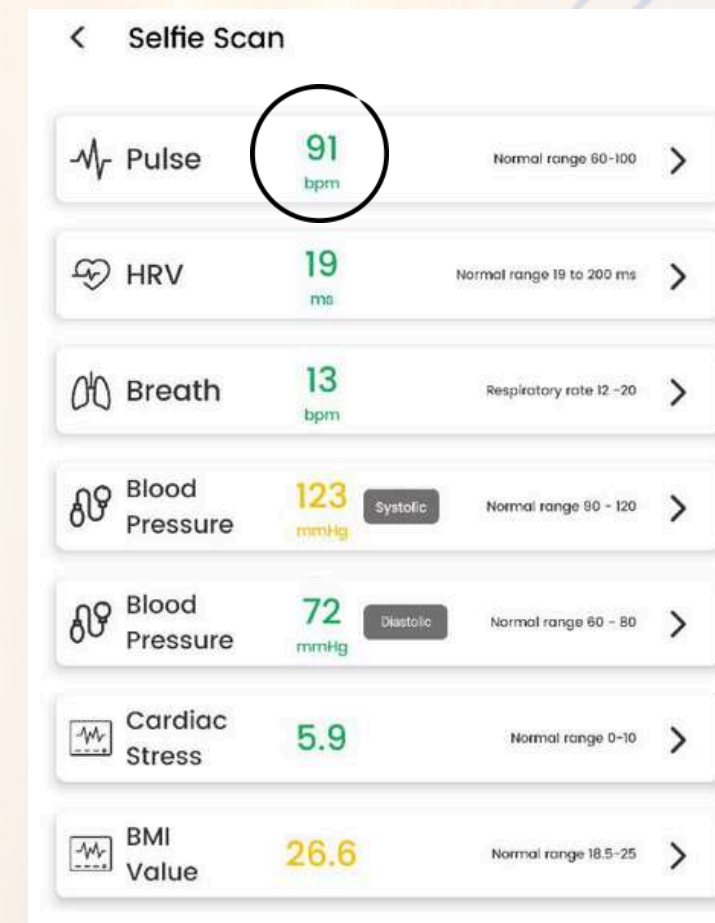
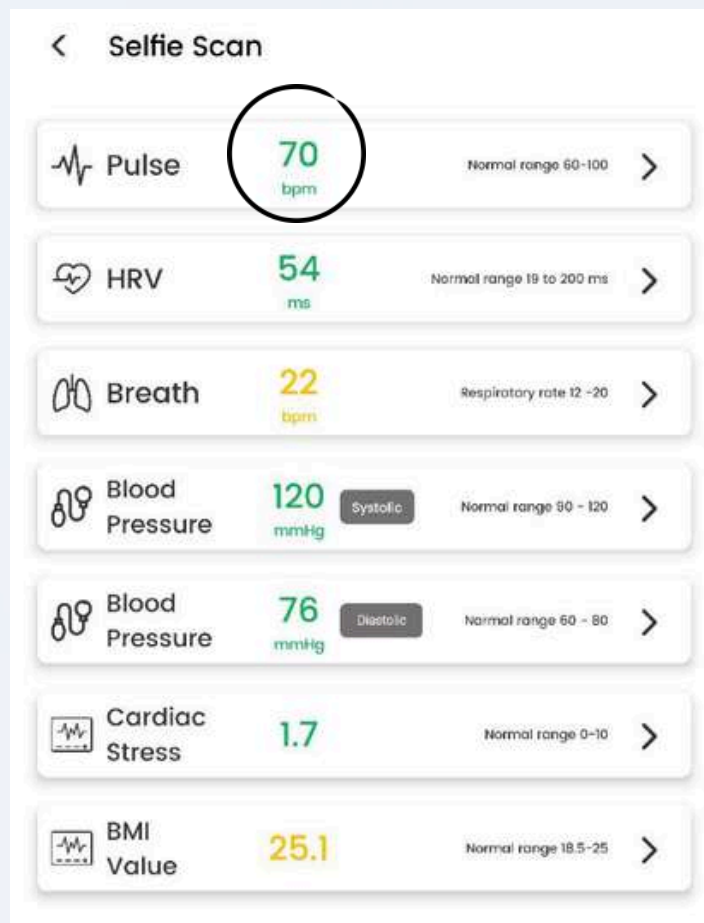
1) Doc99 Selfie Scan by Dialog



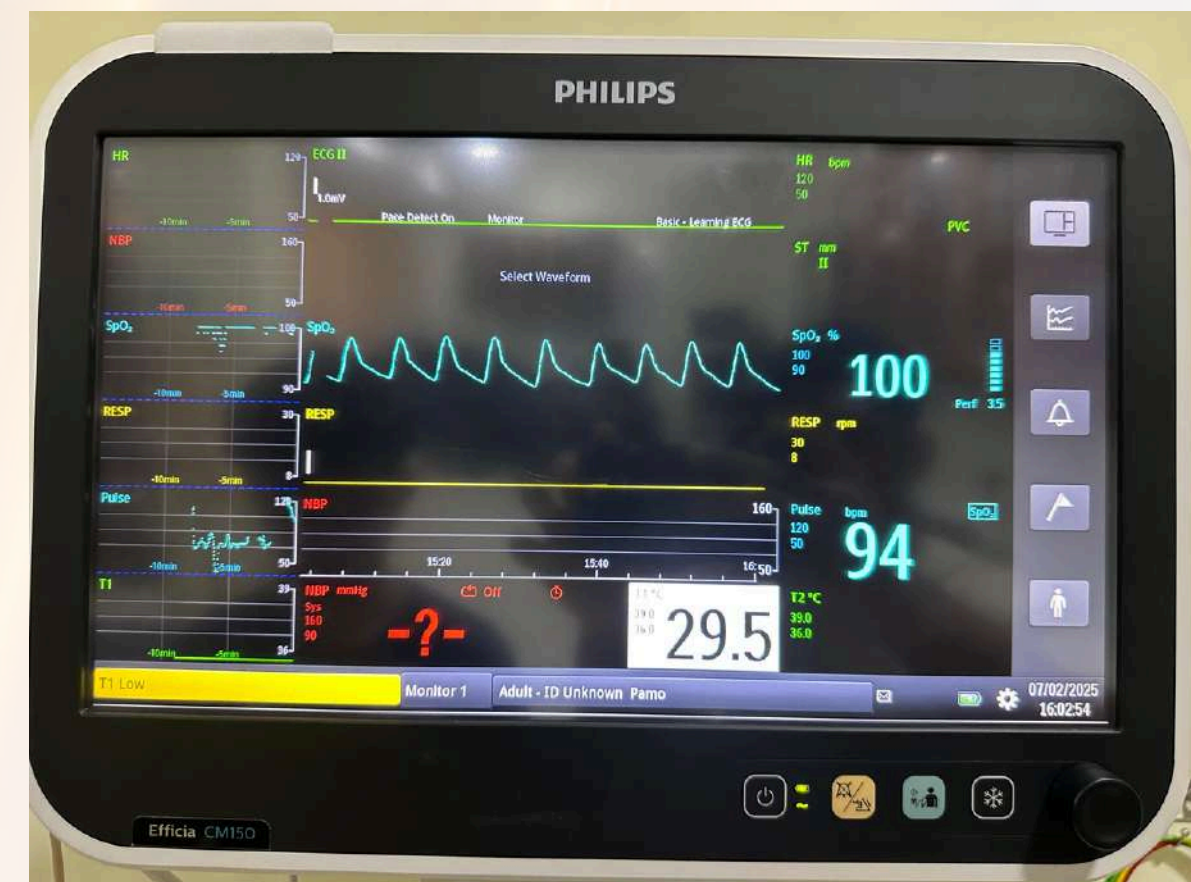
Normal



After Running



Normal

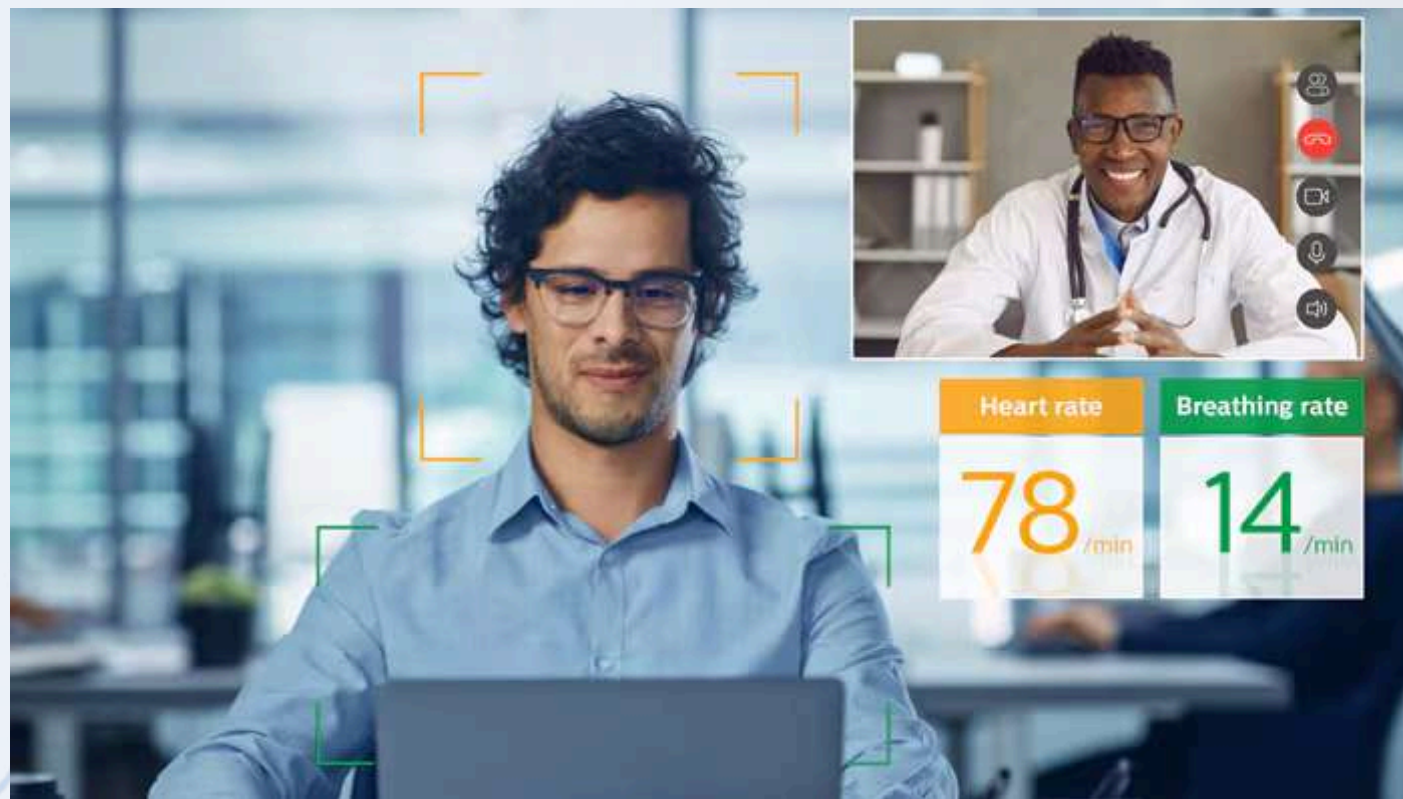


After Running

Physiological Signal Extraction from Video

Existing Solutions:

2)VitalSigns Camera by Philips



- Uses remote PPG
- Camera tracks rise/fall of chest and abdomen to determine respiration rate
- Tiny changes in skin color caused by HR are detected (invisible micro-blushes)
- Philips solved many challenges associated with this technique (motion, light, etc.)

Novelty

Technical Novelty

- **Privacy-preserving architecture**: only extracted physiological features are sent to the cloud, not raw video - ensuring neonatal anonymity and compliance with data privacy regulations.

Domain Novelty

- First known attempt at non-contact **Neonatal Blood Pressure** estimation via facial videos.
- Improve non-contact **Neonatal SpO₂ level** prediction via facial videos

Architectural Comparison for rPPG Modeling.

	3D CNN	Transformers(ViT)	Mamba
Temporal Modeling	Local spatio-temporal via 3D kernels	Long-range via self-attention	Long-range via efficient recurrence
Compute Cost	Low	High(quadraitc)	Low
Strengths	Good spatial + short-term temporal features	Captures long-term dependencies	Efficient long-term sequence modeling
Limitations	Struggles with very long sequences	Computationally expensive	Still new in vision tasks
Suitability	Baseline	High accuracy	Real-time, long-sequence

State-of-the-Art rPPG Models

1) FactorizePhys

- 3D CNN + FSAM (Factorized Self-Attention Module)
- Captures rich multi-dimensional features
- Boosts generalization and interpretability
- Uses Nonnegative Matrix Factorization (NMF) for attention
- Modular: FSAM works with other CNNs
- Parameters - 0.05M

State-of-the-Art rPPG Models

2) RhythmFormer

- Transformer + Periodic Sparse Attention (PSA)
- Leverages heartbeat periodicity to guide attention
- Captures long-term patterns efficiently
- Strong intra- and cross-dataset results
- Pre-attention filters noise, improves fine-grained signals
- Parameters - 3.25 M

State-of-the-Art rPPG Models

3) PhysMamba

- Mamba SSM + SlowFast dual stream
- Combines local motion + long-term dynamics
- Efficient for long sequences (linear time)
- Ideal for real-time and mobile use
- Temporal Difference Block + multi-scale fusion
- Parameters - 0.56 M